

# EXHIBIT 114

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF VIRGINIA  
ALEXANDRIA DIVISION

United States of America, )  
et al., )  
 ) Case No.  
Plaintiffs, ) 1:23-cv-00108-LMB-JFA  
 )  
vs. )  
 )  
Google, LLC, )  
 )  
Defendant. )

VIDEO RECORDED DEPOSITION OF WENKE LEE, PhD

Wednesday, March 6, 2024, 9:45 a.m.

US Department of Justice, Antitrust Division  
450 5th Street, NW  
Washington, DC

Reported By: Marjorie Peters, FAPR, RMR, CRR, RSA  
Job Number: CS 6484701

<p style="text-align: right;">Page 2</p> <p>1 VIDEO RECORDED DEPOSITION OF WENKE LEE, PhD,  2 a witness herein, called by the Defendant for  3 examination, taken pursuant to the Notice, by and  4 before Marjorie Peters, a Registered Merit Reporter,  5 Certified Realtime Reporter and Notary Public in and  6 for the District of Columbia, at US Department of  7 Justice, Antitrust Division, 450 5th Street, NW,  8 Washington, DC, on Wednesday, March 6, 2024, at  9 9:45 a.m.  10  11  12  13  14  15  16  17  18  19  20  21  22</p>	<p style="text-align: right;">Page 4</p> <p>1 INDEX  2 EXAMINATION PAGE  3 WENKE LEE PHD  4 By Ms. MAUSER 8  5 INDEX OF EXHIBITS  6 W. LEE EXHIBIT PAGE  7 Exhibit 1 Introduction to 14  8 Information Security  9 Exhibit 2 Rate my Professor 28  10 Exhibit 3 Lee Report 54  11 Exhibit 4 "Your Online Interests - 72  12 Pwned! A Pollution Attack  13 Against Targeted  14 Advertising"  15 Exhibit 5 "Financial Lower Bounds of 93  16 Online Advertising Abuse"  17 Exhibit 6 "Understanding 117  18 Malvertising Through  19 Ad-Injecting Browser  20 Extensions"  21 Exhibit 7 ads.txt standard 181  22</p>
<p style="text-align: right;">Page 3</p> <p>1 APPEARANCES  2 For the Plaintiff:  3 Sean Carman, Esquire  4 Aaron M. Teitelbaum, Esquire  5 Senior Litigation Counsel, Antitrust Division  6 U.S. Department of Justice  7 450 Fifth Street NW  8 Washington, DC 20530  9 Mobile: (202) 894-4266  10  11 For the Defendant:  12 Amy Mauser, Esquire  13 Katherine Stewart, Esquire  14 PAUL, WEISS, RIFKIND, WHARTON &amp; GARRISON LLP  15 2001 K Street, NW  16 Washington, DC 20006-1047  17 amauser@paulweiss.com  18 202-223-7371  19  20 ALSO PRESENT:  21 David Campbell, Legal Videographer  22</p>	<p style="text-align: right;">Page 5</p> <p>1 INDEX OF EXHIBITS  2 W. LEE EXHIBIT PAGE  3 Exhibit 8 "Working with the industry 185  4 towards a fraud-free media  5 supply chain"  6 Exhibit 9 IAB Tech Lab, Authorized 189  7 Sellers for Apps  8 (app-ads.txt), Final  9 specification version 1.0  10 Exhibit 10 Sellers.json 200  11 Exhibit 11 "FAQ for sellers.json and 200  12 SupplyChain Object"  13 Exhibit 12 e-mail 7.9.18, 204  14 GOOG-AT-MDL-007043716  15 Exhibit 13 "Introduction to Prebid 227  16 for Header Bidding" is  17 what is on the header of  18 the doc, but in the body  19 it says "Introduction to  20 Prebid"  21  22</p>

<p style="text-align: right;">Page 62</p> <p>1 with the FBI and Damballa.</p> <p>2 MR. CARMAN: Objection. Form.</p> <p>3 Asked and answered.</p> <p>4 A. Like I said, my report, the way I</p> <p>5 prepared the report is based on the materials I</p> <p>6 cited.</p> <p>7 I did not cite Damballa. I did not</p> <p>8 FBI -- my engagement with FBI. So those</p> <p>9 experiences -- I mean, those experiences, you know,</p> <p>10 they do not directly influence how I wrote my</p> <p>11 report.</p> <p>12 Q. Were they relevant to your report?</p> <p>13 MR. CARMAN: Objection. Form.</p> <p>14 A. So like I said, I cited materials that I</p> <p>15 rely on for this report.</p> <p>16 I did not cite Damballa. I did not</p> <p>17 cite my engagement with the FBI.</p> <p>18 Q. You mentioned you had a fourth</p> <p>19 interaction with the FBI.</p> <p>20 Can you tell me about that.</p> <p>21 A. So I think there were two FBI agents,</p> <p>22 and then the third one, because the other one got</p>	<p style="text-align: right;">Page 64</p> <p>1 we just -- we actually stopped a year ago.</p> <p>2 Q. Did your work with Damballa ever involve</p> <p>3 the digital advertising ecosystem?</p> <p>4 MR. CARMAN: Objection. Form.</p> <p>5 A. So like I said, the beginning month or</p> <p>6 the first year, we were selling data to various</p> <p>7 industry players to use our knowledge of botnet or</p> <p>8 let's say where are the bots, for them to, you know,</p> <p>9 block spam, block click frauds.</p> <p>10 So that was one example of relevance</p> <p>11 to digital advertising, from -- specifically --</p> <p>12 Q. Sorry.</p> <p>13 A. -- with Damballa experience.</p> <p>14 Q. Did any participant in the digital</p> <p>15 advertising ecosystem buy your technology?</p> <p>16 MR. CARMAN: Objection. Form.</p> <p>17 A. I don't recall. I mean, some of these</p> <p>18 buyers of our data, some were --</p> <p>19 (Clarification requested by the Realtime</p> <p>20 Stenographer.)</p> <p>21 A. Some of the buyers of our -- some of the</p> <p>22 buyers of our data or technology data, some were</p>
<p style="text-align: right;">Page 63</p> <p>1 reassigned, they requested to meet with me, let's</p> <p>2 say, once a month, just checking. They call it</p> <p>3 engagement, committee engagement.</p> <p>4 It was basically try to, you know,</p> <p>5 ask my opinions of some of the latest threats. You</p> <p>6 know, what do I -- you know, what's my opinion on</p> <p>7 some of the threat landscapes and, you know, that</p> <p>8 kind of thing.</p> <p>9 So it's not a specific operation,</p> <p>10 but every now and then, they would say, oh, do you</p> <p>11 know about this, do you know about that, kind of</p> <p>12 thing.</p> <p>13 Q. Did you have any interactions with the</p> <p>14 FBI relating to the digital advertising ecosystem?</p> <p>15 A. I don't recall specifically. I would</p> <p>16 just say some of the questions that they ask, they</p> <p>17 would point to some, you know, pretty large-scale</p> <p>18 kind of attack.</p> <p>19 But I stopped this kind of</p> <p>20 engagement more than a year ago because I was like,</p> <p>21 look, I mean, you can probably talk to some other</p> <p>22 professor because I'm not busy with other stuff, so</p>	<p style="text-align: right;">Page 65</p> <p>1 sensitive. They -- sometimes they don't tell us</p> <p>2 what they're doing. That includes actually quite a</p> <p>3 few US government agencies. Yeah.</p> <p>4 So I don't recall the details of who</p> <p>5 bought what for how long.</p> <p>6 Q. Well, at Damballa, did you enter into</p> <p>7 any contractual arrangements with any participant in</p> <p>8 the digital advertising ecosystem?</p> <p>9 A. Again, I was not involved in the actual</p> <p>10 business transaction, per say. I was more like a</p> <p>11 cofounder on the technical side.</p> <p>12 I know that we had some very</p> <p>13 in-depth discussion, maybe even contractual</p> <p>14 discussions with some of the major players.</p> <p>15 Q. Did any of your interactions with the</p> <p>16 FBI involve Header Bidding?</p> <p>17 MR. CARMAN: Objection. Form.</p> <p>18 A. No. I don't recall.</p> <p>19 Well, like I said, some of the</p> <p>20 details may escape me, you know, but I don't recall.</p> <p>21 Q. Did any of the work you did at Damballa</p> <p>22 involve Header Bidding?</p>

<p style="text-align: right;">Page 66</p> <p>1 MR. CARMAN: Objection. Form.</p> <p>2 A. I don't recall that.</p> <p>3 MS. MAUSER: We have been going over</p> <p>4 an hour, I don't know if you want to --</p> <p>5 MR. CARMAN: Do you want to keep</p> <p>6 going?</p> <p>7 THE WITNESS: No, yeah, I'm fine.</p> <p>8 I'll be fine. Yeah, thank you.</p> <p>9 MR. CARMAN: Okay.</p> <p>10 MS. STEWART: Court reporter, are</p> <p>11 you fine?</p> <p>12 COURT REPORTER: Yeah, I'm fine.</p> <p>13 MR. TEITELBAUM: Just for my own</p> <p>14 benefit, actually, if you guys don't mind a short</p> <p>15 break.</p> <p>16 MR. CARMAN: Would you say now.</p> <p>17 MR. TEITELBAUM: Doesn't need to be</p> <p>18 very long.</p> <p>19 THE VIDEOGRAPHER: Off the record at</p> <p>20 10:46.</p> <p>21 (RECESS, 10:46 a.m. - 11:01 a.m.)</p> <p>22 THE VIDEOGRAPHER: Back on the</p>	<p style="text-align: right;">Page 68</p> <p>1 including some of the existing technologies. And</p> <p>2 then you say, okay, and then you arrive at some</p> <p>3 meaningful results for people to evaluate the</p> <p>4 effectiveness of the technology.</p> <p>5 And then I say, okay, you know, not</p> <p>6 only my technology is so effective, I'm better, here</p> <p>7 is the comparison with others.</p> <p>8 So I would say these five-step</p> <p>9 principles are the basic methodology in any field,</p> <p>10 and particularly, in scientific discovery and</p> <p>11 technical advances. I practice this every day. I</p> <p>12 teach my students, expect them to do the same.</p> <p>13 I essentially am, you know, using</p> <p>14 these five-step principles to analyze every opinion</p> <p>15 that Mr. Ferrante -- and conclusion that he offered</p> <p>16 in his report. That's the step I -- the methodology</p> <p>17 I used.</p> <p>18 Q. Okay.</p> <p>19 I'd like to turn to some of the</p> <p>20 presentations and articles that you've written.</p> <p>21 In the appendix with your -- to your</p> <p>22 report with your CV --</p>
<p style="text-align: right;">Page 67</p> <p>1 record at 11:01.</p> <p>2 BY MS. MAUSER:</p> <p>3 Q. Professor Lee, do you have your report</p> <p>4 in front of you?</p> <p>5 A. Yes.</p> <p>6 Q. Does this report contain all the</p> <p>7 opinions that you intend to offer in this case?</p> <p>8 A. Yes. So my assignment, like I said, was</p> <p>9 to analyze Mr. Ferrante's report, so that's my</p> <p>10 opinions regarding his report.</p> <p>11 Q. Does the report contain all the bases</p> <p>12 for your opinions?</p> <p>13 A. Yeah. I would start by saying that I</p> <p>14 applied this methodology that's very well</p> <p>15 established in any field, which is for you to offer</p> <p>16 opinion, you have to first describe, you know, what</p> <p>17 problem you are addressing, what are the different</p> <p>18 factors of this -- aspects of this problem that</p> <p>19 would lead you to believe how effective technology</p> <p>20 should be.</p> <p>21 I then describe, okay, here is the</p> <p>22 technology that I used to address this problem,</p>	<p style="text-align: right;">Page 69</p> <p>1 A. Okay.</p> <p>2 Q. -- you have 15 refereed journal papers;</p> <p>3 is that right?</p> <p>4 A. I'm sorry. How many?</p> <p>5 Q. 15, I believe.</p> <p>6 A. 15. Oh, wait. You mean the journal</p> <p>7 papers?</p> <p>8 Q. Yes.</p> <p>9 A. Yeah. Okay. Yes.</p> <p>10 Q. None of them specifically relate to the</p> <p>11 digital advertising ecosystem, do they?</p> <p>12 MR. CARMAN: Objection. Form.</p> <p>13 Foundation.</p> <p>14 A. Oh, let me take a look.</p> <p>15 Again, what is your question, again?</p> <p>16 Q. Do any of these 15 articles or papers</p> <p>17 specifically relate to digital advertising?</p> <p>18 MR. CARMAN: Same objection.</p> <p>19 A. I don't recall from these 15 journal</p> <p>20 papers, but they do talk about some background</p> <p>21 technologies.</p> <p>22 Q. Okay.</p>

<p style="text-align: right;">Page 70</p> <p>1 I'd like to -- okay, why don't we</p> <p>2 mark -- I want to -- you have a refereed conference</p> <p>3 presentation that I want to discuss with you, that</p> <p>4 we're going to pull up so you can actually see it,</p> <p>5 that relates to malvertising.</p> <p>6 A. Okay.</p> <p>7 Q. We may not have it.</p> <p>8 If you could turn to the section of</p> <p>9 your conference presentations, there's number 58.</p> <p>10 MR. CARMAN: What page of the report</p> <p>11 are we on?</p> <p>12 MS. MAUSER: It's in his CV. Page</p> <p>13 19 of his CV.</p> <p>14 THE WITNESS: Yeah.</p> <p>15 BY MS. MAUSER:</p> <p>16 Q. The presentation is called "Unraveling</p> <p>17 the Relationship Between Ad-Injecting Browser</p> <p>18 Extensions and Malvertising."</p> <p>19 Do you see that?</p> <p>20 A. Yeah. I see that. Yes.</p> <p>21 Q. We're just seeing if we have it. We</p> <p>22 thought we had it. If we don't, maybe we'll get it</p>	<p style="text-align: right;">Page 72</p> <p>1 (W. Lee Exhibit 4, "Your Online Interests - Pwned!</p> <p>2 A Pollution Attack Against Targeted Advertising",</p> <p>3 was marked for identification.)</p> <p>4 COURT REPORTER: Okay. So this is</p> <p>5 Number 4.</p> <p>6 MS. MAUSER: We'll give you a copy</p> <p>7 of it, so you...</p> <p>8 MR. CARMAN: Oh, thanks. Yeah.</p> <p>9 BY MS. MAUSER:</p> <p>10 Q. When you wrote this article in 2014,</p> <p>11 were you aware of any actual instances of the</p> <p>12 pollution attack that you describe in the paper</p> <p>13 taking place in the digital advertising ecosystem?</p> <p>14 MR. CARMAN: Objection. Form.</p> <p>15 MS. MAUSER: What's objectionable</p> <p>16 about the question?</p> <p>17 MR. CARMAN: You didn't define what</p> <p>18 you mean by "digital advertising ecosystem."</p> <p>19 BY MS. MAUSER:</p> <p>20 Q. Dr. Lee, do you understand what I mean</p> <p>21 by "digital advertising ecosystem"?</p> <p>22 A. I would prefer that you qualify it so</p>
<p style="text-align: right;">Page 71</p> <p>1 and we maybe can return to this.</p> <p>2 Can you get it and then we'll return</p> <p>3 to it later.</p> <p>4 We'll return to this. I thought we</p> <p>5 had a copy, but I apologize.</p> <p>6 A. Okay. Okay.</p> <p>7 Q. Also in your CV, you have a conference</p> <p>8 presentation that's called "Your Online Interests -</p> <p>9 Pwned!," and for the court reporter, it's P-W-N-E-D</p> <p>10 exclamation, "A Pollution Attack Against Targeted</p> <p>11 Advertising."</p> <p>12 Do you see that?</p> <p>13 MR. CARMAN: Again, can you tell us</p> <p>14 what page you're on?</p> <p>15 MS. MAUSER: It's under Conference</p> <p>16 Presentations in the CV, and it is number -- he</p> <p>17 refers to it throughout his report. It's on page</p> <p>18 20.</p> <p>19 Dr. Lee also refers to it throughout</p> <p>20 the text of his report.</p> <p>21 MR. CARMAN: Ah. So this is 62.</p> <p>22 Okay. Thank you.</p>	<p style="text-align: right;">Page 73</p> <p>1 that we can put this paper in proper context, I</p> <p>2 would say.</p> <p>3 Q. Do you know what digital advertising is?</p> <p>4 A. Yes, I do.</p> <p>5 Q. Do you know what -- do you know who the</p> <p>6 participants in the -- in digital advertising are?</p> <p>7 A. Yes, I do.</p> <p>8 Q. Who are the participants in digital</p> <p>9 advertising?</p> <p>10 A. So you have the user browsing the web,</p> <p>11 but you also have the web publishers, you have the</p> <p>12 advertisers on the other end. In between, you have</p> <p>13 multiple parties try to -- essentially, how to bring</p> <p>14 the ads to the publisher so they can appear on the</p> <p>15 page, so the user can see it.</p> <p>16 So that includes servers, server</p> <p>17 site, DNS platforms --</p> <p>18 (Clarification requested by the Realtime</p> <p>19 Stenographer.)</p> <p>20 A. You have the -- so the supply-side</p> <p>21 platforms, demand-side platforms, ad exchanges.</p> <p>22 Yeah.</p>

<p style="text-align: right;">Page 174</p> <p>1 contents that deemed inappropriate and harmful.</p> <p>2 I'm using that as an example of you</p> <p>3 basically have to define what do you mean by content</p> <p>4 that's inappropriate, what do you mean by content</p> <p>5 that's harmful?</p> <p>6 Then you can say, oh, you know, this</p> <p>7 problem, of course, is very complex, but here are</p> <p>8 the factors I considered to define this problem.</p> <p>9 Right. And based on that, here is the technology I</p> <p>10 used to block them.</p> <p>11 You can't just say, I block</p> <p>12 inappropriate contents and harmful contents.</p> <p>13 Exactly what do you mean? There's no way for me to</p> <p>14 actually find that kind of a statement to be</p> <p>15 meaningful, useful, without giving the proper</p> <p>16 definition, the scoping of the problem, and</p> <p>17 accordingly, the technology that you use, and what's</p> <p>18 the detection rate, you know, false alarm rate and,</p> <p>19 you know, have you considered all these participants</p> <p>20 such as, you know, who produced the contents, who --</p> <p>21 you know, who distributed them, are there activists</p> <p>22 group involved, so on and so forth.</p>	<p style="text-align: right;">Page 176</p> <p>1 Q. The reports that were discussed in</p> <p>2 Mr. Ferrante's report.</p> <p>3 MR. CARMAN: Objection. Form.</p> <p>4 Foundation.</p> <p>5 A. Let me see. I might have -- let me see.</p> <p>6 So are you referring to the annual</p> <p>7 report that they talk about, some of these numbers?</p> <p>8 Q. Yes.</p> <p>9 A. Okay.</p> <p>10 So I do recall browsing those pages.</p> <p>11 All I can recall is that there's basically a very</p> <p>12 short one-page, no more than two pages of summary</p> <p>13 statement to say, oh, Google, you know, for this</p> <p>14 kind of -- you know, Google that's -- how to put it?</p> <p>15 They would say, Google blocked these many of, let's</p> <p>16 say, bad ads, but never goes into how they defined,</p> <p>17 let's say, bad ads, what's the policy, what's the</p> <p>18 process, none of that.</p> <p>19 Q. Did you review the policies referenced</p> <p>20 in those reports?</p> <p>21 MR. CARMAN: Objection. That</p> <p>22 mischaracterizes the reports, and to form and</p>
<p style="text-align: right;">Page 175</p> <p>1 It's, again, the basic, you know,</p> <p>2 five-step principles that Mr. Ferrante had failed to</p> <p>3 follow.</p> <p>4 Q. Did you review the policies that -- did</p> <p>5 you review the Google policies that defined the</p> <p>6 content falling into the -- to each of the</p> <p>7 categories addressed in Mr. Ferrante's report?</p> <p>8 MR. CARMAN: Objection. Form.</p> <p>9 Foundation.</p> <p>10 A. So again, my task is to look at</p> <p>11 Mr. Ferrante's report, and analyze how he arrives at</p> <p>12 those opinions and conclusion. Like I said, I did</p> <p>13 not find that he cited any of these policies and</p> <p>14 technologies.</p> <p>15 So that's my opinion, is that</p> <p>16 whatever conclusion and result he presents, because</p> <p>17 the process did not follow these five-step</p> <p>18 principles, his opinions and conclusions are not</p> <p>19 useful and meaningful to me.</p> <p>20 Q. Did you review Google's safety and</p> <p>21 transparency reports?</p> <p>22 A. Which one do you refer to?</p>	<p style="text-align: right;">Page 177</p> <p>1 foundation.</p> <p>2 A. So, like I said, my job is to -- my</p> <p>3 assignment was to analyze Mr. Ferrante's report, and</p> <p>4 look at how he arrived at those, you know, plots and</p> <p>5 opinions and conclusion. And like I said, I find</p> <p>6 that he failed to follow these five-step principles.</p> <p>7 For example, if they have a policy</p> <p>8 statement that you could explain, because hey,</p> <p>9 here's Google policy. Here's how they define it.</p> <p>10 Here's how they analyze it. He should have put</p> <p>11 those into the report. That's -- you know, that --</p> <p>12 you know.</p> <p>13 So again, my job is to analyze his</p> <p>14 report, and I use this five-step principle to say,</p> <p>15 well, he failed to follow these five-step</p> <p>16 principles.</p> <p>17 So I just find that his opinions and</p> <p>18 conclusion are not useful and meaningful to me.</p> <p>19 Q. Did you see links in those reports to --</p> <p>20 those reports are publicly available; correct?</p> <p>21 A. The reference cited by Mr. Ferrante, as</p> <p>22 I recall it, was publicly available. I clicked on</p>



<p style="text-align: right;">Page 178</p> <p>1 it, I saw the page. I saw, okay, here's the number</p> <p>2 that Mr. Ferrante had used to plot. That's the --</p> <p>3 and then I looked at the page that I was able to</p> <p>4 follow and -- click and follow it.</p> <p>5 It's like -- like I said, there's</p> <p>6 pretty much not enough information for me to</p> <p>7 understand what Google's policy really is, how they</p> <p>8 define the problem, what technology do they use, you</p> <p>9 know, what's the detection rate, false alarm rate,</p> <p>10 and so on, none of that.</p> <p>11 Q. Do you recall if those reports contain</p> <p>12 links to the actual policies describing the</p> <p>13 applicable policies?</p> <p>14 MR. CARMAN: Objection to form.</p> <p>15 Foundation.</p> <p>16 A. So like I said, you know, my job is to</p> <p>17 analyze Mr. Ferrante's report as it is. I read the</p> <p>18 references that he relied on to render the opinions</p> <p>19 and conclusion.</p> <p>20 I find that he failed to follow</p> <p>21 these five-step principles. And that's why I -- you</p> <p>22 know, my opinion is that his opinions and conclusion</p>	<p style="text-align: right;">Page 180</p> <p>1 A. Okay.</p> <p>2 Q. The first sentence says, "Publishers and</p> <p>3 advertisers rely on effective and readily available</p> <p>4 countermeasures to counteract any potential tendency</p> <p>5 of Header Bidding to reduce the security of their</p> <p>6 platforms. These include, for example, widely</p> <p>7 adopted industry standards such as ads.txt as well</p> <p>8 as app-ads.txt, sellers.json, and OpenRTB</p> <p>9 SupplyChain, all of which are useful in preventing</p> <p>10 fraud by allowing publishers, resellers and</p> <p>11 advertisers in a bidding transaction to verify and</p> <p>12 confirm each other's identities."</p> <p>13 A. Yeah. I see that.</p> <p>14 Q. Is it your opinion, Professor Lee, that</p> <p>15 the combination of ads.txt, app-ads.txt,</p> <p>16 sellers.json, and OpenRTB SupplyChain provided</p> <p>17 publishers and advertisers effective and readily</p> <p>18 available countermeasures to counteract any</p> <p>19 potential tendency of Header Bidding to reduce the</p> <p>20 security of their platforms?</p> <p>21 MR. CARMAN: Objection to form.</p> <p>22 A. So here, what I said is "all of which</p>
<p style="text-align: right;">Page 179</p> <p>1 that he offer in the report is basically not useful</p> <p>2 and not meaningful.</p> <p>3 Q. Could you turn to Paragraph 109.</p> <p>4 MS. MAUSER: What time -- how long</p> <p>5 have we been going since...</p> <p>6 THE VIDEOGRAPHER: Hour and seven</p> <p>7 minutes.</p> <p>8 MS. MAUSER: I'm about to start</p> <p>9 another topic, so I don't know if you want to take a</p> <p>10 break.</p> <p>11 MR. CARMAN: This seems like a good</p> <p>12 time.</p> <p>13 THE WITNESS: Yeah, sure, yeah.</p> <p>14 Okay.</p> <p>15 THE VIDEOGRAPHER: Off the record at</p> <p>16 1:58.</p> <p>17 (RECESS, 1:58 p.m. - 2:14 p.m.)</p> <p>18 THE VIDEOGRAPHER: Back on the</p> <p>19 record at 2:14.</p> <p>20 BY MS. MAUSER:</p> <p>21 Q. Professor Lee, would you turn to</p> <p>22 Paragraph 109 of your report.</p>	<p style="text-align: right;">Page 181</p> <p>1 are useful," yep, that's what I said.</p> <p>2 Q. The combination of these four standards</p> <p>3 made Header Bidding safer?</p> <p>4 MR. CARMAN: Objection to form.</p> <p>5 Q. Did the combination -- did the adoption</p> <p>6 of these four standards make Header Bidding safer?</p> <p>7 MR. CARMAN: Objection to form.</p> <p>8 A. Yes. I think so, yes.</p> <p>9 Q. Let's start with ads.txt.</p> <p>10 Can you mark the ads.txt standard.</p> <p>11 (W. Lee Exhibit 7, ads.txt standard, was marked for</p> <p>12 identification.)</p> <p>13 COURT REPORTER: This is Number 7.</p> <p>14 THE WITNESS: Okay. Thank you.</p> <p>15 BY MS. MAUSER:</p> <p>16 Q. Dr. Lee, do you know when the ads.txt</p> <p>17 standard was issued?</p> <p>18 A. When?</p> <p>19 Q. Mm-hmm.</p> <p>20 A. The document that I read here,</p> <p>21 version 1.0, that's the official document that I was</p> <p>22 able to access as well, 1.0.</p>



<p style="text-align: right;">Page 182</p> <p>1 So it says June 2017.</p> <p>2 Q. Do you know who authored the ads.txt</p> <p>3 standard?</p> <p>4 A. If you look at the first page, you talk</p> <p>5 about authors, and a bunch of significant</p> <p>6 contributions from, you know, a bunch of</p> <p>7 participants.</p> <p>8 Q. Was George Levitte, project manager of</p> <p>9 Google, one of the two authors?</p> <p>10 A. Yes. That's a -- that's what's listed</p> <p>11 here as one of the two authors.</p> <p>12 Q. Were four Google employees listed as</p> <p>13 significant contributors to the standard?</p> <p>14 MR. CARMAN: Objection. Foundation.</p> <p>15 A. Yes, there are a few Google -- a few</p> <p>16 Google employees, but so are a bunch of other</p> <p>17 industry participants, including White Ops, such as</p> <p>18 Dan Kaminsky, and companies such as -- let's see</p> <p>19 here. I mean, there are a bunch of IAB people,</p> <p>20 including the author of the document, IAB Tech,</p> <p>21 which is an industry group, and so on. There are</p> <p>22 many participants, actually.</p>	<p style="text-align: right;">Page 184</p> <p>1 to --</p> <p>2 MR. CARMAN: I have tried to connect</p> <p>3 it.</p> <p>4 Also, I'm sorry, because I know</p> <p>5 you've had a hard day, this is like the last thing</p> <p>6 you need.</p> <p>7 MS. MAUSER: Should we go off the</p> <p>8 record until we get it fixed?</p> <p>9 MR. CARMAN: Yeah. Please. Yeah.</p> <p>10 THE VIDEOGRAPHER: Off the record at</p> <p>11 2:21.</p> <p>12 (RECESS, 2:21 p.m. - 2:22 p.m.)</p> <p>13 THE VIDEOGRAPHER: Back on the</p> <p>14 record at 2:22.</p> <p>15 BY MS. MAUSER:</p> <p>16 Q. Professor Lee, do you know if the</p> <p>17 ads.txt standard was adopted before or after Google</p> <p>18 adopted Open Bidding?</p> <p>19 A. I don't recall specifically. I think</p> <p>20 the timeline is pretty close. I don't recall one</p> <p>21 way or another. No, I don't recall the details of</p> <p>22 that comparison of time, timestamps.</p>
<p style="text-align: right;">Page 183</p> <p>1 Q. Including Google participants?</p> <p>2 A. Again, Google, you know, employees is</p> <p>3 among the group of significant contributors.</p> <p>4 Q. Right. One of the two authors was a</p> <p>5 Google employee?</p> <p>6 A. That's correct, and the lead author is</p> <p>7 an IAB person.</p> <p>8 Q. Do you know, Dr. Lee, when the standard</p> <p>9 was issued in relation to when Google adopted Open</p> <p>10 Bidding?</p> <p>11 MR. CARMAN: I'm sorry.</p> <p>12 Q. Do you know if it was before or after</p> <p>13 Google adopted Open Bidding?</p> <p>14 MR. CARMAN: I'm sorry. We're not</p> <p>15 getting our realtime.</p> <p>16 MS. MAUSER: I'm sorry.</p> <p>17 MR. CARMAN: No, I hate to --</p> <p>18 MS. MAUSER: So we're -- I wonder if</p> <p>19 you just need to -- because we're getting it.</p> <p>20 MR. CARMAN: No, that's what I have</p> <p>21 done several times.</p> <p>22 MR. TEITELBAUM: Yeah, we just tried</p>	<p style="text-align: right;">Page 185</p> <p>1 Q. Did Google push the industry to adopt</p> <p>2 the ads.txt standard?</p> <p>3 MR. CARMAN: Objection. Form.</p> <p>4 A. What do you mean by "push"; like</p> <p>5 specific -- can you, like, be specific with your</p> <p>6 question?</p> <p>7 Q. Sure.</p> <p>8 We'll show you a document that may</p> <p>9 help the questioning.</p> <p>10 (W. Lee Exhibit 8, "Working with the industry</p> <p>11 towards a fraud-free media supply chain", was marked</p> <p>12 for identification.)</p> <p>13 COURT REPORTER: This is Number 8.</p> <p>14 THE WITNESS: Thank you.</p> <p>15 BY MS. MAUSER:</p> <p>16 Q. We just marked a document called</p> <p>17 Ads.Txt's adoption: IAB's program grows 5.4 times</p> <p>18 in 2018.</p> <p>19 Oh, wait. No, we didn't. I'm</p> <p>20 looking at the wrong one. You should just have --</p> <p>21 I'm sorry. Yeah. Okay. I'm sorry.</p> <p>22 I'm sorry, I'll correct the record.</p>

<p style="text-align: right;">Page 186</p> <p>1 We just handed Dr. Lee a document</p> <p>2 called "Working with the industry towards a</p> <p>3 fraud-free media supply chain."</p> <p>4 A. Okay.</p> <p>5 Q. If you turn to page 3 of the document,</p> <p>6 in the second paragraph, it says, "We believe the</p> <p>7 ads.txt standard is a significant step forward in</p> <p>8 the fight against ad fraud, and by the end of</p> <p>9 October, DoubleClick Bid Manager will only buy a</p> <p>10 publisher's inventory from sources identified as</p> <p>11 authorized sellers in its ads.txt file when a file</p> <p>12 is available."</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. Did that drive the adoption of ads.txt?</p> <p>16 MR. CARMAN: Objection to form. And</p> <p>17 foundation.</p> <p>18 Q. Did the requirement by DoubleClick</p> <p>19 Manager that publishers adopt ads.txt play a factor</p> <p>20 in driving the adoption of ads.txt?</p> <p>21 MR. CARMAN: Objection to form.</p> <p>22 Foundation.</p>	<p style="text-align: right;">Page 188</p> <p>1 The problem with the question, I</p> <p>2 think, is instead of asking him what he knows about</p> <p>3 the adoption, and what he understands terms to mean,</p> <p>4 you're asking him a vague question that could mean a</p> <p>5 lot of different things.</p> <p>6 MS. MAUSER: What's vague about the</p> <p>7 question?</p> <p>8 MR. CARMAN: The words "widely</p> <p>9 adopted."</p> <p>10 MS. MAUSER: I thought he used</p> <p>11 similar words.</p> <p>12 MR. CARMAN: Well, my objection is</p> <p>13 that there's --</p> <p>14 MS. MAUSER: Okay, hold on. I'll</p> <p>15 use the words that he used in my question.</p> <p>16 MR. CARMAN: Okay.</p> <p>17 BY MS. MAUSER:</p> <p>18 Q. When did ads.txt become adopted by the</p> <p>19 industry?</p> <p>20 MR. CARMAN: Same objection.</p> <p>21 A. I did not specifically track the</p> <p>22 timeline, per se. I know that, let's say, the first</p>
<p style="text-align: right;">Page 187</p> <p>1 A. So I think this paragraph talks about</p> <p>2 Google's intention to use ads.txt, right, as a</p> <p>3 requirement, meaning that the publisher should have</p> <p>4 ads.txt on the publisher's site, our their account</p> <p>5 with Google. But that's a common understanding that</p> <p>6 the intention of ads.txt is, as a publisher, you</p> <p>7 should have your ads.txt; otherwise, you know, the</p> <p>8 buyers would -- you know, would find that it's hard</p> <p>9 to verify your identity and maybe some of the</p> <p>10 exchanges will not do -- you know, will not kind of</p> <p>11 support you.</p> <p>12 So there's a common understanding,</p> <p>13 and the fact is, I think, many publishers are</p> <p>14 starting to use it. So that's the extent I</p> <p>15 understand ads.txt being adopted by the industry.</p> <p>16 Q. Do you know when ads.txt became widely</p> <p>17 adopted by the industry?</p> <p>18 MR. CARMAN: Objection to form.</p> <p>19 Foundation.</p> <p>20 MS. MAUSER: Can you tell me what</p> <p>21 the problem with the question is.</p> <p>22 MR. CARMAN: Yeah.</p>	<p style="text-align: right;">Page 189</p> <p>1 version, 1.0, document was published, let's say,</p> <p>2 2017, but I think recall quoting some of the</p> <p>3 references I cited in the -- in my report to say</p> <p>4 that there were evidence of adoption of ads.txt that</p> <p>5 contribute to the reduction of domain spoofing. You</p> <p>6 know, so that would be after 2017.</p> <p>7 I didn't track exactly year by year</p> <p>8 kind of industry adoption rate. I do not think that</p> <p>9 I got the same kind of analysis or result from</p> <p>10 Mr. Ferrante's report, either. I don't know whether</p> <p>11 Google actually published these kind of numbers,</p> <p>12 either.</p> <p>13 Q. Let's turn to the app-ads.txt file.</p> <p>14 (W. Lee Exhibit 9, IAB Tech Lab, Authorized Sellers</p> <p>15 for Apps (app-ads.txt), Final specification version</p> <p>16 1.0, was marked for identification.)</p> <p>17 Q. Let me know when you've finished the</p> <p>18 press release.</p> <p>19 A. Okay.</p> <p>20 Q. When was the app-ads.txt standard</p> <p>21 adopted?</p> <p>22 MR. CARMAN: Objection. Foundation.</p>

<p style="text-align: right;">Page 190</p> <p>1 Q. Was the app-ads.txt file adopted?</p> <p>2 MR. CARMAN: Same objection.</p> <p>3 A. So I noted this document says, final</p> <p>4 spec version 1.0. It was published in 2019.</p> <p>5 App-ads.txt.</p> <p>6 I did not check -- did not track the</p> <p>7 years of when it was adopted, by how much, and the</p> <p>8 annual growth rate. All that, I did not track.</p> <p>9 But according to the document, this,</p> <p>10 you know, 1.0 document was published in March 2019.</p> <p>11 That's all I know.</p> <p>12 Q. So it was adopted sometime after -- it</p> <p>13 was adopted by industry players sometime after March</p> <p>14 2019?</p> <p>15 A. Again, I did not track in terms of</p> <p>16 the -- how widely adopted app-ads.txt really is. I</p> <p>17 mean, for what I have read and also refreshed my</p> <p>18 memory by reading, again, the abstract, this really</p> <p>19 is not in the same domain as what we're talking</p> <p>20 about in this matter, which is open display app</p> <p>21 segment.</p> <p>22 This is about mobile app developers.</p>	<p style="text-align: right;">Page 192</p> <p>1 Normally, in my field, I mean, you</p> <p>2 have seen some of my academic papers, we list</p> <p>3 everybody who is involved in the authors list, and</p> <p>4 for them to say, authors and contributors,</p> <p>5 significant contributors, kind of strange to me.</p> <p>6 But in any case, my point is that it</p> <p>7 seem to -- seems to acknowledge there are a lot of</p> <p>8 participants. They obviously contribute to the</p> <p>9 document.</p> <p>10 The also same goes to the ads.txt,</p> <p>11 the version 1.0. They list the significant</p> <p>12 contributors.</p> <p>13 So obviously, those people who</p> <p>14 got -- who are listed, they made significant</p> <p>15 contribution to the document, and maybe they only</p> <p>16 list the authors that typed the words.</p> <p>17 I mean, again, I want to emphasize</p> <p>18 the fact that there are a lot of industry</p> <p>19 participants in this kind of effort, and that's what</p> <p>20 this document actually tries to convey.</p> <p>21 Q. But Google's software engineer, Curtis</p> <p>22 Light, is -- is identified as one of the two</p>
<p style="text-align: right;">Page 191</p> <p>1 You want to make sure that it's not an impersonation</p> <p>2 of an app developer. This site is not related to</p> <p>3 open display web, you know, ad technologies.</p> <p>4 And of course, related to, in</p> <p>5 general, you know, reputation, identity theft, so on</p> <p>6 and so forth.</p> <p>7 That's to the extent I understand</p> <p>8 app-ads.txt.</p> <p>9 Q. Professor Lee, who authored the</p> <p>10 app-ads.txt standard?</p> <p>11 MR. CARMAN: Objection. Foundation.</p> <p>12 And form.</p> <p>13 A. So if I read the -- one of the -- you</p> <p>14 know, the page there, it talks about authors. There</p> <p>15 are two co-authors. And then, again, there are a</p> <p>16 list of significant contributors from a number of</p> <p>17 companies, including, you know, IAB, you know, and</p> <p>18 so on.</p> <p>19 I would just say that, you know, I</p> <p>20 don't know how IAB -- this kind of document -- I</p> <p>21 mean, it's kind of -- to me, it's a little bit odd</p> <p>22 to say, authors and other contributors.</p>	<p style="text-align: right;">Page 193</p> <p>1 authors; correct?</p> <p>2 A. Yes. That's what's being listed as one</p> <p>3 of the authors. But again, like I said, I want to</p> <p>4 emphasize the fact that they took the effort --</p> <p>5 well, they basically listed all the significant</p> <p>6 contributors.</p> <p>7 From what I'm understanding is that</p> <p>8 these people must have made significant contribution</p> <p>9 to this document, the contents of this document;</p> <p>10 otherwise, they wouldn't have been listed.</p> <p>11 Now, the actual writing itself may</p> <p>12 be, you know, Curtis -- you know, Curtis Light and</p> <p>13 Curt Larson did a lot of typing and wordsmithing,</p> <p>14 and so on, but the fact that they list significant</p> <p>15 contributors means that these people really</p> <p>16 contribute to the standard. I mean, that's how I</p> <p>17 understand, yeah.</p> <p>18 Q. Do you know if it was that Curtis Light</p> <p>19 and Curt Larson first brought the standard to IAB,</p> <p>20 and then IAB, with these other significant</p> <p>21 contributors, finalized the standard?</p> <p>22 MR. CARMAN: Objection. Form.</p>

<p style="text-align: right;">Page 198</p> <p>1 app-to-developer domain link, participants should  2 view the handling of the domain-to-authorized seller  3 enforcement as nearly identical to that used in  4 ads.txt for web inventory..."</p> <p>5 So really, what I'm trying to say  6 here is that app-ads.txt or ads.txt, if you discover  7 one is for ad -- one is for web app -- one is for  8 web advertising, the other one is for app  9 distribution, other than that, the kind of process  10 of verifying is coming from a trusted, verified  11 source. It's basically the same.</p> <p>12 So that's why in 109, I say, yeah,  13 by using that, you essentially cut down domain  14 spoofing, regardless the actual application.</p> <p>15 And then say, why is it useful to --  16 let's say, to Header Bidding, it's really in the  17 following sense: In fact, we talked about earlier  18 in -- I think in my Section IV, Subsection -- remind  19 myself when I talk about Subsection 4, we talk about  20 open system, combining multiple data sources.</p> <p>21 I would say that from an advertising  22 point of view, for Header Bidding, you can use this</p>	<p style="text-align: right;">Page 200</p> <p>1 I said, you know, by reading this document, this  2 document was published in March 2019, I don't know  3 exactly when Open Bidding or the previous name,  4 however Google called it, was first proposed.</p> <p>5 I would -- you know, if I recall  6 it -- again, you know, I don't recall it very  7 clearly, but even by reading something about, around  8 that time, Google had already offered or at least  9 planned something similar to Open Bidding by 2019.</p> <p>10 Q. I'm sorry. Okay.  11 (W. Lee Exhibit 10, Sellers.json, was marked for  12 identification.)</p> <p>13 MS. MAUSER: Okay. I'm going to  14 mark another exhibit that you can look at in  15 connection with the one that's put in front of you.</p> <p>16 THE WITNESS: Okay.  17 (W. Lee Exhibit 11, "FAQ for sellers.json and  18 SupplyChain Object", was marked for identification.)</p> <p>19 BY MS. MAUSER:  20 Q. The first document says "Sellers.json"  21 by IAB Lab, and we're going to also mark as the next  22 exhibit "FAQ for sellers.json and SupplyChain</p>
<p style="text-align: right;">Page 199</p> <p>1 additional information to say, hey, is this domain  2 trustworthy? If this domain has been engaged with  3 falsifying developer ID in the app, distribution  4 side of things, maybe we shouldn't trust this domain  5 to sell ads.</p> <p>6 I mean, just like -- just very  7 common sense in cybersecurity is reputation, and  8 sometimes we say the flip side -- well, another way  9 to look at this is guilty by association, meaning  10 that if a different viewpoint says, this domain has  11 been used for bad activities, stay away from it.</p> <p>12 So again, like I said, app-ads.txt  13 tries to enforce in the app distribution world, you  14 can verify the developer are coming from the trusted  15 website. So it's completely relevant to ad  16 placement on their website.</p> <p>17 So if I'm doing Header Bidding, I  18 would welcome this kind of information, for sure.</p> <p>19 Q. Do you know when app-ads.txt was adopted  20 in relation to when Google began offering Open  21 Bidding or Exchange Bidding?</p> <p>22 A. I don't recall the exact timeline. Like</p>	<p style="text-align: right;">Page 201</p> <p>1 Object."</p> <p>2 A. Mm-hmm.  3 Thank you.</p> <p>4 Q. Do you know when IAB -- do you know --  5 we talked earlier about sellers.json and SupplyChain  6 Object as standards that IAB adopted; correct?</p> <p>7 MR. CARMAN: Objection. Foundation.  8 Form.</p> <p>9 A. I would say that if you want to find  10 official documents, you go to IAB Labs. I think  11 that applies to ads.txt, app-ads.txt, I think also  12 it applies to sellers.json.</p> <p>13 Q. What about SupplyChain Object?</p> <p>14 A. I believe so. I mean, that's a source I  15 consistently go to.</p> <p>16 Q. Yeah.</p> <p>17 A. I mean, I didn't verify there's other  18 sources that talk about this thing as well, but IAB  19 seems to be the place to go with these kind of  20 things.</p> <p>21 Q. Do you know if these standards were  22 adopted by IAB in 2019?</p>

<p style="text-align: right;">Page 202</p> <p>1 A. Can you repeat the question again?</p> <p>2 Q. Do you know when these two standards</p> <p>3 were adopted by IAB?</p> <p>4 MR. CARMAN: Objection to form.</p> <p>5 A. Without -- I mean, I don't know when we</p> <p>6 cited it, but like I said, you know, normally, you</p> <p>7 can go to IAB Lab website and look at the list of</p> <p>8 documents they have, they would tell you it's a 1.0</p> <p>9 document. I mean, you could share with me the 1.0</p> <p>10 document. You list the date it's being published,</p> <p>11 right.</p> <p>12 So that -- so those are the kind of</p> <p>13 days I normally refer to as when this becomes a, you</p> <p>14 know, new core standard or not that IAB want to --</p> <p>15 want people to adopt.</p> <p>16 Q. Do you know whether sellers.json was --</p> <p>17 do you know whether sellers.json was adopted after</p> <p>18 Google adopted Exchange Bidding, and then Open</p> <p>19 Bidding?</p> <p>20 MR. CARMAN: Objection. Form.</p> <p>21 A. So by "Exchange Bidding," are you</p> <p>22 referring to the former name of Open Bidding, or</p>	<p style="text-align: right;">Page 204</p> <p>1 had in the adoption of sellers.json?</p> <p>2 MR. CARMAN: Objection. Form.</p> <p>3 A. I don't recall that specifically. Like</p> <p>4 I said, you know, when I study these kind of</p> <p>5 technologies, there's some background information, I</p> <p>6 go to IAB Lab's website and look at their official</p> <p>7 documents, and normally, they list, you know, who</p> <p>8 are the group of significant contributors, and</p> <p>9 what's the intent of this kind of a, you know,</p> <p>10 recommendation, and so on, so forth.</p> <p>11 I just don't recall seeing, you</p> <p>12 know, the role of Google.</p> <p>13 Q. We're going to mark another document,</p> <p>14 which is an internal Google document. It's an</p> <p>15 e-mail exchange. Dated July 9, 2018.</p> <p>16 (W. Lee Exhibit 12, e-mail 7.9.18,</p> <p>17 GOOG-AT-MDL-007043716, was marked for</p> <p>18 identification.)</p> <p>19 THE WITNESS: Thank you.</p> <p>20 MR. CARMAN: Can I ask if this</p> <p>21 document was cited by Mr. Ferrante in his report, do</p> <p>22 you know?</p>
<p style="text-align: right;">Page 203</p> <p>1 what do you mean?</p> <p>2 Q. Yeah, I'm really using the -- it's the</p> <p>3 same thing, but change -- the name changed over</p> <p>4 time.</p> <p>5 A. I did not track the timeline, you know,</p> <p>6 so I did not track the timeline. Like I said, you</p> <p>7 know, to nail down some of these timelines, I would</p> <p>8 go to IAB Lab's website and look at the version 1.0</p> <p>9 document, and see when was it published. And that,</p> <p>10 I would -- I would use that as more or less the</p> <p>11 official "rollout dates."</p> <p>12 And for Open Bidding, I would</p> <p>13 probably do the same thing.</p> <p>14 But like I said, I don't recall the</p> <p>15 exact day that Google started to talk about Exchange</p> <p>16 Bidding, and then something else, E, sub E, or</p> <p>17 extreme something.</p> <p>18 I think it was probably some time</p> <p>19 frame of anywhere from 2017 to 2018. I don't know</p> <p>20 for sure. Okay. So I didn't track the exact</p> <p>21 timestamps.</p> <p>22 Q. Do you know what, if any, role Google</p>	<p style="text-align: right;">Page 205</p> <p>1 MS. MAUSER: I don't believe so.</p> <p>2 MR. CARMAN: Okay.</p> <p>3 THE WITNESS: Okay.</p> <p>4 BY MS. MAUSER:</p> <p>5 Q. On the second page of the e-mail, it</p> <p>6 says, "Per," P-E-R, which is referring to Per</p> <p>7 Bjorke --</p> <p>8 A. Hold on. I'm sorry. Second page,</p> <p>9 meaning I have to flip this over?</p> <p>10 Q. The very top -- yeah. The back side of</p> <p>11 the document.</p> <p>12 A. Okay. Okay.</p> <p>13 Q. "...who has been leading the SupplyChain</p> <p>14 and sellers.json standards, is unfortunately going</p> <p>15 on vacation..."</p> <p>16 Do you have any reason to disagree</p> <p>17 or to doubt that Per Bjorke was leading the</p> <p>18 SupplyChain and sellers.json standards?</p> <p>19 MR. CARMAN: Objection. Foundation.</p> <p>20 And form.</p> <p>21 A. So this is one piece of document they</p> <p>22 provide to me that's from Google. That's where I</p>



<p style="text-align: right;">Page 206</p> <p>1 read about Per. But I don't recall reading about</p> <p>2 Google's contribution when I remember reading about</p> <p>3 sellers.json on IAB Lab website.</p> <p>4 So, you know, I would rather look at</p> <p>5 the -- let's say, the official website and official</p> <p>6 documents that IAB Lab put out to render my opinion.</p> <p>7 Q. Do you know when Header Bidding was</p> <p>8 first introduced?</p> <p>9 MR. CARMAN: Objection. Form.</p> <p>10 Foundation.</p> <p>11 MS. MAUSER: What are the form and</p> <p>12 foundation issues with that question?</p> <p>13 MR. CARMAN: It's the word</p> <p>14 "introduced." It's -- I think it would be better to</p> <p>15 start with a -- in other words, we haven't</p> <p>16 established what Wenke's knowledge is of that</p> <p>17 question. What he understands "introduced" to mean</p> <p>18 in this context.</p> <p>19 BY MS. MAUSER:</p> <p>20 Q. You discuss Header Bidding in your</p> <p>21 report; correct?</p> <p>22 A. I discuss Header Bidding in my report in</p>	<p style="text-align: right;">Page 208</p> <p>1 Bidding?</p> <p>2 A. Like I said, I'm not checking the</p> <p>3 specific timelines. That was not actually relevant</p> <p>4 to my -- the task of analyzing Mr. Ferrante's</p> <p>5 report, per se.</p> <p>6 But I would say that if I remember</p> <p>7 right, I think by 2018, you know, Header Bidding was</p> <p>8 starting to be adopted.</p> <p>9 Q. Were you aware of any use of Header</p> <p>10 Bidding in 2009?</p> <p>11 A. Like I said, I did not check specific</p> <p>12 timelines in terms of who, when, first use. That's</p> <p>13 very hard to actually measure. And you basically</p> <p>14 have to know the whole internet. Know every single</p> <p>15 publisher and ask them, hey, do you use Header</p> <p>16 Bidding, kind of thing.</p> <p>17 So I didn't track the timeline in</p> <p>18 terms of who and when was first use, and the</p> <p>19 adoption rate change from year to year, but like I</p> <p>20 said, my opinion stands with regard to when Header</p> <p>21 Bidding was introduced, and why it was adopted.</p> <p>22 And again, you know, my job is to</p>
<p style="text-align: right;">Page 207</p> <p>1 the context of analyzing Mr. Ferrante's report.</p> <p>2 Q. When -- over what time period do you</p> <p>3 discuss Header Bidding; what's the time period for</p> <p>4 Header Bidding in your report?</p> <p>5 MR. CARMAN: Objection. Form.</p> <p>6 Q. Rephrase it this way:</p> <p>7 Are you discussing Header Bidding in</p> <p>8 any specific moment in time in your report?</p> <p>9 MR. CARMAN: Objection. Form.</p> <p>10 A. So like I said, you know, my task was</p> <p>11 analyzing Mr. Ferrante's report.</p> <p>12 I don't recall seeing Mr. Ferrante</p> <p>13 referring Open Bidding or Header Bidding with</p> <p>14 specific timeline.</p> <p>15 So like I said, my task was analyze</p> <p>16 his report and offer my opinion. So my opinion is</p> <p>17 not dependent on the specific timestamp you are</p> <p>18 referring to.</p> <p>19 Q. Do you know when -- when did Header</p> <p>20 Bidding -- when was the first use of Header Bidding?</p> <p>21 A. So what do you mean by "first use"?</p> <p>22 Q. When did publishers begin to use Header</p>	<p style="text-align: right;">Page 209</p> <p>1 analyze Mr. Ferrante's report. I don't think he</p> <p>2 offered that kind of timelines.</p> <p>3 Q. Do you know who the -- who was the</p> <p>4 founder of Header Bidding?</p> <p>5 MR. CARMAN: Objection. Form.</p> <p>6 A. I don't recall the -- I don't recall the</p> <p>7 names, but I do remember reading, you know, names of</p> <p>8 group people behind this effort, yeah, but I don't</p> <p>9 recall the specific names.</p> <p>10 Q. Do you know who Brian O'Kelley is?</p> <p>11 A. Again, without the context to refresh my</p> <p>12 memory, I cannot -- sorry, I cannot recall the</p> <p>13 context where or whether I saw his name.</p> <p>14 Q. Do you know what AppNexus was?</p> <p>15 MR. CARMAN: Objection. Form.</p> <p>16 A. Yep. AppNexus is one of the supply-side</p> <p>17 platforms, I think. Yeah.</p> <p>18 Q. Do you know when Google first introduced</p> <p>19 Open Bidding or Exchange Bidding?</p> <p>20 MR. CARMAN: Objection. Form.</p> <p>21 Q. As it was known when it was first</p> <p>22 introduced?</p>

<p style="text-align: right;">Page 210</p> <p>1 A. Sorry. Can you repeat the question</p> <p>2 again?</p> <p>3 Q. Yes.</p> <p>4 Do you know when Google first</p> <p>5 introduced Open Bidding or Exchange Bidding?</p> <p>6 A. I remember reading documents to say that</p> <p>7 Open Bidding or whatever the previous name, Exchange</p> <p>8 Bidding, was introduced or discussed -- or discussed</p> <p>9 or introduced within Google in response to Header</p> <p>10 Bidding.</p> <p>11 So obviously, it's after Header</p> <p>12 Bidding. That's how I can infer.</p> <p>13 Q. You said Header Bidding was introduced</p> <p>14 in 2018?</p> <p>15 MR. CARMAN: Objection.</p> <p>16 Q. Again --</p> <p>17 MR. CARMAN: Form.</p> <p>18 A. Yeah. Sorry. I said, I do not remember</p> <p>19 the exact timestamp. I do not track the timestamp.</p> <p>20 But if my memory serves me right,</p> <p>21 2018 is the time where, you know, Header Bidding was</p> <p>22 probably adopted already.</p>	<p style="text-align: right;">Page 212</p> <p>1 A. I did not track those kind of volumes,</p> <p>2 as per bidding technology, per se, for example.</p> <p>3 Again, my job is to analyze</p> <p>4 Mr. Ferrante's report. I don't think he offered</p> <p>5 that, but I know that around 2014, there are a</p> <p>6 number of bidding technologies, like Waterfall,</p> <p>7 Real-Time, and so, yeah.</p> <p>8 (Clarification requested by the Realtime</p> <p>9 Stenographer.)</p> <p>10 A. For example, Waterfall, Real-Time, and</p> <p>11 so on.</p> <p>12 MR. TEITELBAUM: Waterfall.</p> <p>13 A. Waterfall, yeah.</p> <p>14 Q. Do you know what the most common forms</p> <p>15 of programmatic bidding were in 2015?</p> <p>16 MR. CARMAN: Objection. Form.</p> <p>17 A. So like I said, I did not track the</p> <p>18 timeline of these technologies year over year.</p> <p>19 You know, my job is to analyze</p> <p>20 Mr. Ferrante's report. I don't think he ever</p> <p>21 mentioned that kind of numbers or render any</p> <p>22 opinions of that. Yeah.</p>
<p style="text-align: right;">Page 211</p> <p>1 Is it before that, after that, I</p> <p>2 don't know for sure, but the neighborhood of 2018</p> <p>3 probably would be, you know, close to what it is.</p> <p>4 MR. CARMAN: Objection to form.</p> <p>5 Again, we haven't defined what we mean by "adopted."</p> <p>6 Q. Do you know when the open-source code</p> <p>7 for Header Bidding was first made available?</p> <p>8 MR. CARMAN: Objection. Form.</p> <p>9 A. I don't --</p> <p>10 Q. Was -- well, let me rephrase it.</p> <p>11 Was there open-source code for</p> <p>12 Header Bidding?</p> <p>13 A. Yes. It's called Prebid.</p> <p>14 Q. Do you know when that -- when the Prebid</p> <p>15 code was first made available?</p> <p>16 MR. CARMAN: Objection. Form.</p> <p>17 A. Again, I didn't track, you know, the</p> <p>18 specific timelines, but I know that Prebid code</p> <p>19 open-source effort has been around for a while.</p> <p>20 Q. Do you know what the most common form of</p> <p>21 programmatic bidding was in 2014?</p> <p>22 MR. CARMAN: Objection. Form.</p>	<p style="text-align: right;">Page 213</p> <p>1 Q. Do you know what the most common forms</p> <p>2 of programmatic bidding were in 2016?</p> <p>3 MR. CARMAN: Objection. Form.</p> <p>4 A. Again, I did not track the -- I did not</p> <p>5 track the volume or rate of each form of advertising</p> <p>6 being used year to year. No, I don't know. I did</p> <p>7 not track them.</p> <p>8 Q. Do you know when the Waterfall method of</p> <p>9 bidding was used?</p> <p>10 A. Was used?</p> <p>11 Q. Mm-hmm.</p> <p>12 A. I think it was used for quite a while,</p> <p>13 and then I think when Header Bidding, Open Bidding</p> <p>14 came around, then I think Water Bidding (sic) just</p> <p>15 basically became a thing of the past.</p> <p>16 MR. CARMAN: I wanted to -- I meant</p> <p>17 to object to the last question. Sorry. Form.</p> <p>18 Q. When did Waterfall become a thing of the</p> <p>19 past?</p> <p>20 MR. CARMAN: Objection. Form.</p> <p>21 A. Again, I did not track the exact time,</p> <p>22 like, meaning that when -- for example, when Open</p>



<p style="text-align: right;">Page 214</p> <p>1 Bidding, you know, in your term, kept -- was adopted  2 enough that Water Bidding become -- Waterfall became  3 a thing of the past.  4 But I think around -- you know, if  5 my memory serves me right -- again, first of all,  6 these kind of exact timestamp year is actually  7 irrelevant to my assignment for this case because  8 I'm analyzing Mr. Ferrante's report. He never  9 mentioned or make any sort of relevance -- or make  10 this kind of timestamp relevance.  11 But in any case, I think by 2018,  12 Waterfall is basically starting to go away. That's  13 how I remember it.  14 Now, I could remember it wrong.  15 MR. CARMAN: I'm sorry. There's no  16 good time to do this. Can we go off the record?  17 THE VIDEOGRAPHER: Off the record at  18 3:09.  19 (RECESS, 3:09 p.m. - 3:11 p.m.)  20 THE VIDEOGRAPHER: Back on the  21 record at 3:11.  22 BY MS. MAUSER:</p>	<p style="text-align: right;">Page 216</p> <p>1 well-known technology. Anybody can use it. It's  2 available since the '80s, the '90s. Definitely when  3 2000 comes around, people know how to encrypt  4 traffic, and how to authenticate and encrypt  5 traffic, so yeah.  6 Q. Do you know if communications in Open  7 Bidding are encrypted?  8 MR. CARMAN: Objection. Form.  9 A. So again, my job is to analyze  10 Mr. Ferrante's report. I do not believe he offered  11 that kind of details in terms of what traffic is  12 being protected in Open Bidding versus Header  13 Bidding, and much less talking about whether the  14 traffic is encrypted with Open Bidding versus Header  15 Bidding.  16 I don't recall seeing that.  17 Q. Do you know if in Open Bidding, the  18 requests are sent via GAM, and not the user's  19 browser?  20 MR. CARMAN: Objection to form.  21 Foundation.  22 Q. By GAM, I mean Google Ad Manager.</p>
<p style="text-align: right;">Page 215</p> <p>1 Q. Are encrypted communications more secure  2 than unencrypted communications?  3 MR. CARMAN: Objection. Form.  4 A. So again, when you compare, let's say,  5 scenarios like that, you want to --  6 (Clarification requested by the Realtime  7 Stenographer.)  8 A. When you compare scenarios like we just  9 described, you want to consider multiple factors.  10 And so you cannot say, just because you encrypt, you  11 are more secure. There are other factors you want  12 to consider.  13 So I would just say that all things  14 equal, encrypted, yeah, would add more security than  15 not encrypted.  16 Q. In the early days of Header Bidding,  17 user information was not encrypted in the user's  18 browser, was it?  19 MR. CARMAN: Objection. Form.  20 A. I don't know for a fact. I do not know  21 of any facts out there that says that has to be the  22 case, in the sense that encrypted connection is a</p>	<p style="text-align: right;">Page 217</p> <p>1 MR. CARMAN: Objection to form.  2 Foundation.  3 A. So the way I understand it is that for  4 Open Bidding, the publisher will invite exchanges to  5 participate in bidding, and that's taking place in  6 GAM, and so on.  7 But like I said before, Open Bidding  8 actually is implementation of server-side Header  9 Bidding. In server-side Header Bidding, even though  10 you are not using Google, you are essentially doing  11 the same thing on a server that handles this kind of  12 Header Bidding.  13 Q. Do you know which was adopted first,  14 Open Bidding or server bidding?  15 MR. CARMAN: Objection to form.  16 A. Can you repeat the question again?  17 Q. Yes.  18 Do you know which came first, Open  19 Bidding or server-side Header Bidding?  20 MR. CARMAN: Same objection.  21 A. So again, I did not track the timelines.  22 My job is to analyze Mr. Ferrante's</p>

<p style="text-align: right;">Page 218</p> <p>1 report. He did not talk about specifically the</p> <p>2 timeline of, let's say, server-side Header Bidding</p> <p>3 with Open Bidding. Yeah, I'll leave it at that.</p> <p>4 Q. Going back to Open Bidding, do you know</p> <p>5 whether only approved participants can gain access</p> <p>6 to receiving bids?</p> <p>7 MR. CARMAN: Objection. Form.</p> <p>8 Foundation.</p> <p>9 A. The document I read would say that</p> <p>10 the -- as a publisher, the way you invite the</p> <p>11 exchange is that you have a contractual relationship</p> <p>12 with those exchanges, and GAM does not manage those</p> <p>13 relationships.</p> <p>14 I wouldn't say that in server-side</p> <p>15 Header Bidding or even client-side Header Bidding,</p> <p>16 all these security mechanisms, or you call it</p> <p>17 guardrails, according to Mr. Ferrante, are the</p> <p>18 well-known security mechanisms that anybody could</p> <p>19 have or should have adopted.</p> <p>20 So really, I do not see anything</p> <p>21 that Open Bidding is able to do that server-side</p> <p>22 Header Bidding or even client-side Header Bidding</p>	<p style="text-align: right;">Page 220</p> <p>1 make that kind of statement, and I would not agree</p> <p>2 to that statement, without the kind of five-step</p> <p>3 analysis of the problem you are posing.</p> <p>4 Q. How can a man-in-the-middle attack</p> <p>5 intercept data from a user's client's browser?</p> <p>6 MR. CARMAN: Objection. Form.</p> <p>7 A. So man-in-the-middle, in principle,</p> <p>8 means that you are -- let's say A talks to B, you</p> <p>9 are C, you try to insert yourself in the middle,</p> <p>10 pretend to be B to A, and pretend A to B. That's</p> <p>11 the basic, you know, classroom teaching I would</p> <p>12 offer as man in the middle.</p> <p>13 But the point is that how to pull it</p> <p>14 off? Really, again, you have to look at the context</p> <p>15 to whether man in the middle is possible. In other</p> <p>16 words, what A and B can do to prevent man in the</p> <p>17 middle. And there are mechanisms out there,</p> <p>18 well-known mechanisms out there that you could use.</p> <p>19 Q. Do you know if in Open Bidding, because</p> <p>20 the data is server-to-server, bad actors are</p> <p>21 prevented from listening in on client communications</p> <p>22 on the browser, and intercepting the data?</p>
<p style="text-align: right;">Page 219</p> <p>1 could not do.</p> <p>2 Q. Can you explain why client-side</p> <p>3 communications may not be as secure as</p> <p>4 server-to-server communications.</p> <p>5 MR. CARMAN: Objection. Form.</p> <p>6 A. Can you repeat the question again?</p> <p>7 Q. Yes.</p> <p>8 Can you explain why client-side</p> <p>9 communications may not be as secure as</p> <p>10 server-to-server communications.</p> <p>11 MR. CARMAN: Same objection.</p> <p>12 A. First of all, I do not know where that</p> <p>13 statement is coming from, and I would just disagree.</p> <p>14 Like I said, when you say something is not secure, I</p> <p>15 would say, first of all, how do you define security?</p> <p>16 What's the context? What are the mechanisms that</p> <p>17 client-side could not have used?</p> <p>18 Okay. After considering all of</p> <p>19 that, you say, well, I still conclude client-side is</p> <p>20 less secure. Okay. Let's look at that.</p> <p>21 So like I said, I don't think</p> <p>22 Mr. Ferrante offered any evidence or reasoning to</p>	<p style="text-align: right;">Page 221</p> <p>1 MR. CARMAN: Objection. Form.</p> <p>2 A. I --</p> <p>3 MR. CARMAN: Oh, and foundation as</p> <p>4 well.</p> <p>5 A. So whether you can be more specific with</p> <p>6 the question. I do not understand what you mean by</p> <p>7 browser listening in, in an Open Bidding situation.</p> <p>8 I do not follow.</p> <p>9 Q. When data is transmitted to -- from</p> <p>10 server to server, as it is supposed to through the</p> <p>11 browser, is it more secure?</p> <p>12 MR. CARMAN: Objection. Form.</p> <p>13 Foundation.</p> <p>14 A. So again, it really depends on what</p> <p>15 security threats you are talking about, and what are</p> <p>16 the factors and what solutions are out there for you</p> <p>17 to mitigate some of the security risks. Right.</p> <p>18 For example, client-to-server, yeah,</p> <p>19 that traffic can already be authenticated encrypted,</p> <p>20 so why is it less secure than server-to-server?</p> <p>21 There's no basis to render that kind of opinion.</p> <p>22 You have to basically qualify it and say, hey, here</p>

<p style="text-align: right;">Page 270</p> <p>1 mechanisms that was useful, and you expect -- I</p> <p>2 mean, Header Bidding, if you want to compare with</p> <p>3 Header Bidding, why would we expect Header Bidding</p> <p>4 not using it. It's a well-known technique and</p> <p>5 Google yourself proved that it's useful.</p> <p>6 Q. You've talked throughout your -- the day</p> <p>7 on the five steps, and scoping out what the problem</p> <p>8 is, which I think you said is the first step?</p> <p>9 A. Defining the problem, for example --</p> <p>10 Q. Defining the problem.</p> <p>11 A. -- what is bad app, and then scope it.</p> <p>12 Q. Then in the scoping phase, what does the</p> <p>13 scoping phase entail? What factors do you need to</p> <p>14 take into account in the scoping phase?</p> <p>15 A. So in Section IV, the first subsection</p> <p>16 talks about different ways that you define the scope</p> <p>17 of the problem, right. What are the -- you know,</p> <p>18 how complex is the system. Are there multiple</p> <p>19 participants. How they interact. Are you talking</p> <p>20 about some long life cycle attacks. You know, what</p> <p>21 kind of collaborative technology they can put</p> <p>22 together.</p>	<p style="text-align: right;">Page 272</p> <p>1 well-known, available to this well-known set of</p> <p>2 attacks and frauds.</p> <p>3 Q. Didn't Mr. Ferrante say that when Header</p> <p>4 Bidding became more widely adopted in 2014-'15,</p> <p>5 ads.txt had not yet been adopted?</p> <p>6 MR. CARMAN: Objection. Form.</p> <p>7 Foundation.</p> <p>8 A. I don't recall where he said that</p> <p>9 specifically, but regardless, every single time --</p> <p>10 every time you have a new or better technology,</p> <p>11 people adopt it, and then you see improvements of</p> <p>12 security.</p> <p>13 So I -- so that's one example that</p> <p>14 he -- I think when he talked about noise, he did not</p> <p>15 talk about ads.txt. We talk about it in our -- in</p> <p>16 my -- I talk about it in my report to say, first of</p> <p>17 all, he did not define what noise is. He didn't</p> <p>18 talk about why Header Bidding would introduce more</p> <p>19 noise, okay, than otherwise. He didn't talk about</p> <p>20 what are the existing mechanisms that Header Bidding</p> <p>21 players or participants could use to reduce the</p> <p>22 noise.</p>
<p style="text-align: right;">Page 271</p> <p>1 The problem is without properly</p> <p>2 scoping, say, I want to fight spam. Okay. In what</p> <p>3 context, in what scope? Are you trying to eliminate</p> <p>4 100 percent of the spam from all the internet,</p> <p>5 versus you want to basically have a spam filter</p> <p>6 specifically to an organization.</p> <p>7 These kinds of things are super</p> <p>8 important when you say, oh, I'm going to develop</p> <p>9 technology. In what sense?</p> <p>10 Q. If I were scoping out what the situation</p> <p>11 were, the security situation relating to Header</p> <p>12 Bidding in 2016, wouldn't I want to identify what</p> <p>13 kind of collaborative technology existed in 2016?</p> <p>14 MR. CARMAN: Objection. Form. And</p> <p>15 foundation.</p> <p>16 A. So that's exactly my point in Section 2</p> <p>17 of Section IV and Section V.</p> <p>18 In Section IV, I say, look,</p> <p>19 Mr. Ferrante, when he says Header Bidding is worse</p> <p>20 off, he did not -- first of all, did not define the</p> <p>21 problem, scope the problem, and didn't go through,</p> <p>22 hey, there are existing technologies that are</p>	<p style="text-align: right;">Page 273</p> <p>1 I mean, I'm assuming because he did</p> <p>2 not define the scope of the noise, let's say, I</p> <p>3 assume "noise" means, let's say, ad frauds, right.</p> <p>4 And then we say -- in my report, say, ads.txt turns</p> <p>5 out to be very useful available technologies.</p> <p>6 And then we -- I think in my report,</p> <p>7 I cited -- I cited evidence to show that -- let me</p> <p>8 see.</p> <p>9 Yeah. So I think in Paragraph 118,</p> <p>10 I talk about, you know, ads.txt is an example of</p> <p>11 security mechanisms that are available to Header</p> <p>12 Bidding, like to everybody else --</p> <p>13 Q. Mm-hmm.</p> <p>14 A. -- that they could adopt that would</p> <p>15 actually help mitigate the issue with noise or ad</p> <p>16 frauds. In particular, it really -- the adoption of</p> <p>17 ads.txt was very useful in stamping out domain</p> <p>18 spoofing.</p> <p>19 And ads.txt is just one example of a</p> <p>20 security mechanism that Header Bidding participants</p> <p>21 could use. I mean, like I said, they could always</p> <p>22 use blacklisting, whitelisting, reputation, you</p>

<p style="text-align: right;">Page 274</p> <p>1 know, all kind of mechanisms that you use to detect 2 and block malvertising and software downloads, you 3 name it. 4       So the point is that I don't care 5 which year. I mean, it's not important which year. 6 I always sort of compare -- you know, if I want to 7 analyze the security issues facing Header Bidding, 8 and what technology -- security technologies that 9 Header Bidding could use, I already offered my 10 opinion the section -- Paragraph 118 as an example. 11 And in my Section IV, in Subsection 5 and 2, I talk 12 about, hey, these are existing technologies that we 13 should consider when we compare this Header Bidding 14 versus otherwise. 15     Q. When -- before the adoption of 16 ads.txt -- we talked earlier about ads.txt 17 addressing domain spoofing, right, or limiting 18 domain spoofing? 19     A. Yeah. 20     Q. With domain spoofing being limited, did 21 that also limit the volume of bidders? 22       MR. CARMAN: Objection. Form.</p>	<p style="text-align: right;">Page 276</p> <p>1 reduced the number of unvetted bidders? 2     A. Yes, that's the intent of ads.txt. 3       But I would caution to say that 4 normally, we don't say that one security mechanism 5 specifically is one silver bullet that kills 6 everything. 7       Like I said before, ads.txt, they 8 could have used blacklisting, whitelisting, 9 reputation, list device. So, in fact, that's what 10 we said about -- in Paragraph 137, that Google 11 itself talks about -- in this AwBid study, talks 12 about the effectiveness of using blacklisting. 13     Q. Does -- 14     A. Right. 15     Q. I'm sorry. 16     A. So that means blacklisting is a 17 well-known security mechanism that you could use. 18 Yeah. 19     Q. Doesn't the reduction in the number of 20 unvetted bidders reduce the amount of noise? 21       MR. CARMAN: Objection. Form. 22 Foundation.</p>
<p style="text-align: right;">Page 275</p> <p>1 Foundation. 2     A. So again, that goes to my principle 3 about applying these five steps. So you really want 4 to scope the problem by considering multiple 5 factors. 6       So you say security. Okay, does 7 it -- is volume one factor, yes. But that's not the 8 only factor, right. 9       So you can say, hey, what if I start 10 by really -- you know, if I'm doing Header Bidding, 11 I want to work with partners that I trust, already 12 have a reputation. So I don't have to worry about 13 volume. They're the -- you know, let's say if you 14 compare that with, let's say, Waterfall model. 15 Waterfall model says I rank the ten partners by, 16 historically, how well they pay me. You deal with 17 them one by one, and they all trust it. 18       Okay. Now, you go to Header 19 Bidding. I'm going to talk to these same ten people 20 that I trusted, so why is that less secure? These 21 same ten trusted partners, right. 22     Q. But do you agree that with ads.txt, that</p>	<p style="text-align: right;">Page 277</p> <p>1     A. So again, first of all, I would love 2 Mr. Ferrante -- you know, if he have -- he could 3 have, you know, defined what "noise" means. And 4 also talk about, you know, what effect is affecting 5 noise. 6       So the point -- I think the analogy 7 that I gave earlier about, you know, dealing with 8 ten trusted partners I think is a good analogy to 9 say, just because there were more partners and more 10 volume doesn't mean that the noise goes up. 11 Depending, really, who they're dealing with. 12       And as a security matter, you could 13 preselect partners that you trust to deal with. Who 14 said that just because of Header Bidding, you are 15 going to the wild, wild west, and deal with 16 everybody? 17       MR. CARMAN: So we have been going 18 for more than an hour. Would now be a good time for 19 a break? 20       MS. MAUSER: Yeah. Yeah. 21       MR. CARMAN: Okay. 22       THE VIDEOGRAPHER: Off the record at</p>

70 (Pages 274 - 277)

<p style="text-align: right;">Page 278</p> <p>1 4:41. 2 (RECESS, 4:41 p.m. - 4:56 p.m.) 3 THE VIDEOGRAPHER: Back on the 4 record at 4:56. 5 BY MS. MAUSER: 6 Q. Professor Lee, throughout the day, you 7 have talked about your five-step process for 8 analyzing issues. 9 Is that five-step process set out in 10 any peer-reviewed article? 11 A. You mean specifically to these five 12 steps? 13 Q. Mm-hmm. 14 A. I don't recall seeing that, but I would 15 say that's a basic principle that everybody in 16 the -- almost every field of research and technology 17 and development will understand. 18 So let's say in research, the most 19 important thing is so-called repeatable experiment. 20 You say, I discover super connectivity. 21 Okay. Exactly what are you talking 22 about, exactly what factors, how you set up the</p>	<p style="text-align: right;">Page 280</p> <p>1 system products and then do a bake-off. They 2 basically send a set of, let's say, traffic and see, 3 you know, who's doing what and how well they're 4 doing, let's say, in terms of detection rate and 5 false positive rate. 6 Even if you don't go through that, 7 before you can sell a product, you actually do the 8 so-called proof of concept, POC. You deploy the 9 product in an enterprise network, let's say, and 10 then after, let's say, a month, you say, hey, here's 11 my score. 12 You do all that. So, really, what 13 I'm trying to say is that these five steps are basic 14 steps everybody would know and would follow in the 15 work they do, regardless if you're doing research or 16 trying to sell a product or tell people you're doing 17 great things. 18 Q. If I want to read about the five steps, 19 where would I look to read about these five steps? 20 A. Like I said, it's a basic thing. Just 21 like one plus one equals two, I don't know where you 22 can look it up.</p>
<p style="text-align: right;">Page 279</p> <p>1 experiments, what with method do you use, what 2 results do you have, then if people cannot repeat 3 the experiment and achieve the same result, that's 4 basically -- you know, depending on the situation, 5 it can be a fraud, it can be a basically meaningless 6 result. 7 In technology, when they try to sell 8 products, say, oh, I do cybersecurity, and say, I 9 detect intrusions, I block spams, there are 10 well-known ways to evaluate how well you are doing. 11 For example, everybody I help, you 12 know, people with us say, hey, I'm defining -- I'm 13 detecting spam in the following sense. I'm 14 detecting this kind of spam within this kind of 15 context. Here's my technology. 16 Then you will probably tell people, 17 hey, I'm reporting not just numbers, I'm reporting 18 the detection rate, and then, how do I compare with 19 other products. 20 I would tell that you in 21 cybersecurity, there are a lot of labs out there, 22 industry labs, that invite vendors to put in their</p>	<p style="text-align: right;">Page 281</p> <p>1 But like I said, really, I would 2 just say that without doing that, none of our papers 3 would be published. There's a basic 101 in 4 scientific research, is that if your paper, you 5 don't talk about, you don't follow in some sort of 6 form these five steps, your paper will not be 7 published. 8 For example, in our field, you say, 9 I hear there's a new way of detecting some attacks, 10 you normally would say, here's my detection rate, 11 here's my false alarm rate, this is what I'm using, 12 and by the way, if attacker gave me attempt to evade 13 my system in the following ways, and I should 14 consider that factor as well, so when I develop my 15 methods, I have these kind of ways to make this kind 16 of evasion much harder. 17 That's essentially a 18 well-practiced -- I wouldn't say skew. It's a 19 requirement. Okay? None of my students would be 20 able to publish any paper without going through 21 these same five steps. 22 Q. Do you know if these same five steps are</p>


<p style="text-align: right;">Page 282</p> <p>1 followed by law enforcement?</p> <p>2 MR. CARMAN: Objection. Form.</p> <p>3 A. So in my interaction with law</p> <p>4 enforcement, as I said in the morning, I have</p> <p>5 interacted with, you know, some of the FBI special</p> <p>6 agents investigating some of these botnets.</p> <p>7 Like I said, the first interaction,</p> <p>8 as an example, they came in and talked about what we</p> <p>9 do in botnet research.</p> <p>10 Then, of course, we walk through</p> <p>11 what we mean by "botnets," what aspects of botnets</p> <p>12 we are talking about, what technology we use, why we</p> <p>13 think we have a good technology, so on so forth.</p> <p>14 Essentially, like I said, when you</p> <p>15 try to present your solution being something useful,</p> <p>16 you want to go through these steps. This is very</p> <p>17 well -- this is kind of the expected thing you would</p> <p>18 do.</p> <p>19 I don't know into FBI's exact</p> <p>20 detailed operations, but we did walk through these</p> <p>21 kind of steps to understand our technologies.</p> <p>22 Q. Do security coders follow these same</p>	<p style="text-align: right;">Page 284</p> <p>1 cite me for these five steps?</p> <p>2 MR. CARMAN: Objection. Form.</p> <p>3 A. Authority or not, like I said, this is a</p> <p>4 basic thing. Like I said, the basic hallmark in</p> <p>5 science is the repeatable experiment; otherwise, how</p> <p>6 do people believe that we discovered something that</p> <p>7 they can believe in that's relevant and meaningful.</p> <p>8 Like I said, without doing this, I</p> <p>9 wouldn't say you are a scientist or researcher. I</p> <p>10 wouldn't even buy product from you if you cannot</p> <p>11 say, oh, I have a great product.</p> <p>12 Like what?</p> <p>13 We detect a thousand spams a day.</p> <p>14 But with regard to what? What's</p> <p>15 your detection rate? What is the false alarm rate?</p> <p>16 These are basic things, and how they define spam, in</p> <p>17 what context, and so on and so forth.</p> <p>18 Why do I need to be the authority of</p> <p>19 basic things like this? Right.</p> <p>20 I would just say that there are</p> <p>21 various ways that you can look at my record. I</p> <p>22 published so many papers, get cited so many, you</p>
<p style="text-align: right;">Page 283</p> <p>1 five steps?</p> <p>2 A. What do you mean by "security coders"?</p> <p>3 Q. Do you know if in developing security</p> <p>4 standards IAB follows these same five steps?</p> <p>5 MR. CARMAN: Objection. Form.</p> <p>6 A. So I mean, when I read the documents of</p> <p>7 IAB Lab -- you know, from IAB Lab, let's say --</p> <p>8 let's say they talk about, let's say, ads.txt, they</p> <p>9 did talk about -- start by saying what problem</p> <p>10 they're attempting to address. Okay. And the scope</p> <p>11 is, let's say, advertising, and here's the layout of</p> <p>12 the standard -- of the recommendation that, you</p> <p>13 know, they would want the publisher to do, and then</p> <p>14 they say, okay, here's how, then, this information</p> <p>15 is being used.</p> <p>16 That's actually step by step the</p> <p>17 five steps. It may not be in code, but it's the</p> <p>18 thought process. So people can follow, yep, that's</p> <p>19 a good idea. Let's follow it.</p> <p>20 That's what you want to accomplish</p> <p>21 by following these five steps.</p> <p>22 Q. Do you have any authority that you could</p>	<p style="text-align: right;">Page 285</p> <p>1 know, dozens of times, the index (ph), whatever you</p> <p>2 name it, obviously, I follow these basic standards;</p> <p>3 otherwise, nobody would probably care to read my</p> <p>4 papers.</p> <p>5 Q. You have a lot of experience in academic</p> <p>6 settings.</p> <p>7 Do you have any authority that the</p> <p>8 standards that apply in an academic setting apply</p> <p>9 outside of an academic setting?</p> <p>10 MR. CARMAN: Objection. Form.</p> <p>11 A. So as I said earlier, right, I know that</p> <p>12 in cybersecurity, I would think going as far back as</p> <p>13 late 1990s when I was talking to some of the vendors</p> <p>14 and industry labs, they do a bake-off every year to</p> <p>15 evaluate what are the, let's say, good network</p> <p>16 security products, and the way they do this is that</p> <p>17 they -- like I said, they invited us to put their</p> <p>18 system in, and then they let the network run,</p> <p>19 they'll run traffic, and they know what's called</p> <p>20 ground truth, meaning they know which packet or</p> <p>21 which session is bad, which is good.</p> <p>22 And then they say, okay, among the</p>



<p style="text-align: right;">Page 286</p> <p>1 bad ones, how many do you detect, how many false  2 alarms are you generating, you know, and so on and  3 so forth.  4 They actually put out scores like  5 that. So you know, like I said, that's a  6 well-practiced basic, you know, standards and  7 principles that people have been following, even us  8 academia, for a long time, and the reason is, like I  9 said, everybody in the technical field, in the  10 scientific field or even pseudoscience field  11 understand these are basic principles to follow in  12 order for your result to be meaningful, useful.  13 I mean, that's what you want to  14 accomplish. Right. You don't want to publish a  15 paper that nobody cares to read.  16 Q. But you can't point me -- if I wanted to  17 learn about these five steps, you can't point me to  18 any published source that I could read setting forth  19 these five steps?  20 A. So I have not done my own kind of  21 background and say, oh, where do these five steps --  22 five steps are published and codified?</p>	<p style="text-align: right;">Page 288</p> <p>1 basic, I do not know where we do we have to read the  2 definition of these steps and principles.  3 Like I said, also in academia, I do  4 not know a cybersecurity company is able to sell  5 their things without going through these five steps,  6 to be honest.  7 Q. Am I correct that it's your testimony  8 that in defining the problem, the first step, timing  9 does not matter?  10 MR. CARMAN: Objection. Form.  11 A. So that's not what I meant. I meant it  12 was in context. Right.  13 If timing is important, I would  14 consider timing.  15 Q. In what circumstances is timing  16 important?  17 A. Again, it has to be in a context, so you  18 give me an example of context.  19 Q. And in what circumstances is timing  20 important in defining the scope --  21 MR. CARMAN: Objection. Form.  22 Q. -- the second step?</p>
<p style="text-align: right;">Page 287</p> <p>1 But I would say, you know, if you  2 read about what's science, you will read a lot about  3 repeatable experiments.  4 In physics, I can tell you in  5 physics.  6 Let's say I discover, oh, here's a  7 new phenomenon I detected. I discovered super  8 connectivity. There would be quite a few labs  9 trying to repeat the exact same experiments.  10 Even, you know, when they are able  11 to repeat experiments, they with actually publish a  12 paper. You say, what's the point? They published a  13 paper saying the same thing.  14 Yes, because that's a very valuable  15 verification point. Without that, there's no  16 science, no progress. Then how do they know, okay,  17 we're making progress in super connectivity. Is it  18 because somebody says so? No. You need people to  19 verify, and you want people verifying it by  20 accepting the repeated experiment. You are  21 accepting the repeated results.  22 So that's well established. It's so</p>	<p style="text-align: right;">Page 289</p> <p>1 A. I would say that in defining a scope,  2 you have multiple factors to consider, really  3 depending on what factors are relevant to the  4 problem you are trying to solve.  5 So in other words, not all problems  6 will always have all the same factors always.  7 Q. It's your opinion, is it not, that --  8 strike that.  9 You didn't specifically reference  10 the five steps in your report, did you?  11 MR. CARMAN: Objection. Form.  12 Foundation.  13 A. So I actually did. It's pretty obvious.  14 In Section 2, I started by saying,  15 hey, you know -- basically, Section IV is a way to  16 say: Here's how you apply the five steps to analyze  17 the problem domain, scope it, and consider possible  18 solutions.  19 So I started by saying that, you  20 know, we understand, you know, ad fraud is a big  21 problem, and then we talk about, you know,  22 Mr. Ferrante did not follow these five steps, did</p>



<p style="text-align: right;">Page 290</p> <p>1 not describe the problem, scope the problem</p> <p>2 properly, did not describe exactly the solutions</p> <p>3 that Google has offered, did not talk about the</p> <p>4 effectiveness of his approach, and because of that,</p> <p>5 there's no way for us to evaluate Google's</p> <p>6 contribution.</p> <p>7 Q. Didn't Mr. Ferrante describe the</p> <p>8 problems associated with Header Bidding in the 2014</p> <p>9 and 2015 time frame?</p> <p>10 MR. CARMAN: Objection. Form.</p> <p>11 A. So can you point me to the exact context</p> <p>12 in his report that he talks about that?</p> <p>13 Q. Well, you're addressing his report, so</p> <p>14 I'm asking you.</p> <p>15 A. So I think in 137, okay, I talk about,</p> <p>16 you know, he -- you know, Mr. Ferrante says that,</p> <p>17 you know, Header Bidding was not adopted until 2014,</p> <p>18 2015.</p> <p>19 First of all, he did not tell us --</p> <p>20 you know, I mean, I don't recall that he used any</p> <p>21 sources to say that. I mean, he -- I mean, if you</p> <p>22 can, you know, like I said, tell me the context or</p>	<p style="text-align: right;">Page 292</p> <p>1 step two is define the scope, step three is, you</p> <p>2 know -- step four is, what step five is, where you</p> <p>3 actually lay out the methodically what the five</p> <p>4 steps are, the framework for analysis?</p> <p>5 A. Right.</p> <p>6 So as I said at the beginning of</p> <p>7 the -- you know, earlier, I said, these five steps</p> <p>8 are very basic stuff. It's not like -- it's like,</p> <p>9 do you go, say, hey, I'm publishing a paper, I'm</p> <p>10 following these five steps? No, you don't have to</p> <p>11 say that. Everybody knows that.</p> <p>12 Same way when you sell a product.</p> <p>13 Hey, I'm selling a spam detection product. Let me</p> <p>14 go through the five steps for you. Step one, step</p> <p>15 two, step three, step four. No. People expect you</p> <p>16 to say, okay, I'm detecting spam. Let's make sure</p> <p>17 we understand what spam is. We're detecting spam in</p> <p>18 an enterprise. That's my scope. Okay? And then</p> <p>19 here's my method. Here's my detection rate that's</p> <p>20 particularly relevant to make my -- to show that my</p> <p>21 product is effective, and here's how I compare with</p> <p>22 other products by detection rate.</p>
<p style="text-align: right;">Page 291</p> <p>1 give me the references, you know, I can go deeper</p> <p>2 into that.</p> <p>3 So in the context of in my report, I</p> <p>4 say in Paragraph 137 -- you know, we say that</p> <p>5 Mr. Ferrante, as I analyze his report, cited the</p> <p>6 Google's AwBid program to study to compare Google's</p> <p>7 AdX with third-party exchanges, and as we said in</p> <p>8 these paragraphs from 134 to -- you know, go on to</p> <p>9 138, we talk about -- well, actually, 139, all the</p> <p>10 way, we talk about the fact that the report or</p> <p>11 reference I cited was actually about what Google did</p> <p>12 in 2013. It only talks about the effectiveness of</p> <p>13 blacklisting, basically --</p> <p>14 Q. Can you -- I'm sorry.</p> <p>15 A. -- and it's actually irrelevant --</p> <p>16 irrelevant to his opinion of Header Bidding if</p> <p>17 Header Bidding was not adopted until this study, so</p> <p>18 why he is referencing that study to say Header</p> <p>19 Bidding is not as good.</p> <p>20 Q. Can you show me where in your report you</p> <p>21 have the words "five steps," where you say "five</p> <p>22 steps," and you say step one is define the problem,</p>	<p style="text-align: right;">Page 293</p> <p>1 My point is that these are very</p> <p>2 well-established steps and principles. You don't</p> <p>3 say, oh, step one, I'm doing this, step two, I'm</p> <p>4 doing this. No, you don't. It goes without saying.</p> <p>5 People do it.</p> <p>6 So in my report, I would say that in</p> <p>7 Section IV, I essentially lay out how, you know,</p> <p>8 these five steps are being used, they should be</p> <p>9 followed, and how many Mr. Ferrante has failed.</p> <p>10 For example, in Section -- so like I</p> <p>11 said, at the beginning of Section IV, I talk about</p> <p>12 the purpose of Section IV is to essentially using</p> <p>13 this methodology to analyze ad frauds, malvertising,</p> <p>14 and also using these -- follow these five steps to</p> <p>15 consider technologies and evaluate effectiveness,</p> <p>16 right.</p> <p>17 So in Subsection 1, I talk about</p> <p>18 there are, you know -- it essentially talks about</p> <p>19 Mr. Ferrante did not really scope the problem well.</p> <p>20 For example, the first line there that says that,</p> <p>21 you know, this system is very complex. That gives</p> <p>22 you scope, what are you talking about. Ad fraud is</p>

<p style="text-align: right;">Page 346</p> <p>1 THE WITNESS: Thank you.</p> <p>2 THE VIDEOGRAPHER: All right.</p> <p>3 MS. MAUSER: Have a safe trip back.</p> <p>4 THE WITNESS: Thank you.</p> <p>5 THE VIDEOGRAPHER: If that is</p> <p>6 everything, off the record on March 6, 2024 at 6:28.</p> <p>7 (CONCLUDED, 6:28 p.m.)</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>	<p style="text-align: right;">Page 348</p> <p>1 CERTIFICATE OF COURT REPORTER</p> <p>2 I, Marjorie Peters, Fellow of the Academy of</p> <p>3 Reporting, Registered Merit Reporter, Certified</p> <p>4 Realtime Reporter, Realtime Systems Administrator,</p> <p>5 and Notary Public in the District of Columbia,</p> <p>6 before whom the foregoing deposition was taken, do</p> <p>7 hereby certify that the witness was placed under</p> <p>8 oath according to the law; that the foregoing</p> <p>9 transcript is a true and correct record of the</p> <p>10 testimony given; that said testimony was taken by me</p> <p>11 stenographically and thereafter reduced to</p> <p>12 typewriting under my direction, and that I am</p> <p>13 neither counsel for, related to, nor employed by any</p> <p>14 of the parties to this case and have no interest,</p> <p>15 financial or otherwise, in its outcome.</p> <p>16 I further certify that signature was</p> <p>17 not waived by the witness.</p> <p>18 IN WITNESS WHEREOF, I have hereunto set my</p> <p>19 hand, 2023.</p> <p>20 </p> <p>21 Marjorie Peters, FAPR, RMR, CRR, RSA</p> <p>22 My commission expires October 31, 2024.</p>
<p style="text-align: right;">Page 347</p> <p>1 ACKNOWLEDGMENT OF DEPONENT</p> <p>2</p> <p>3 I, WENKE LEE PhD, do hereby acknowledge that</p> <p>4 I have read and examined the foregoing testimony,</p> <p>5 and the same is a true, correct and complete</p> <p>6 transcription of the testimony given by me and any</p> <p>7 corrections appear on the attached Errata sheet</p> <p>8 signed by me.</p> <p>9</p> <p>10</p> <p>11</p> <p>12 _____</p> <p>13 (DATE) (SIGNATURE)</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22 Job No. CS6484701</p>	<p style="text-align: right;">Page 349</p> <p>1 ERRATA SHEET</p> <p>2 IN RE:</p> <p>3 DEPONENT:</p> <p>4 RETURN BY:</p> <p>5 =====</p> <p>6 PAGE/LINE CORRECTION AND REASON</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19 (DATE) (DEPONENT SIGNATURE)</p> <p>20</p> <p>21 NOTARY PUBLIC:</p> <p>22 Job No. CS6484701</p>